

# Cedar Creek Trail Pedestrian Bridge Types

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Segment 3 of the Cedar Creek Trail is approximately 4,050 lineal feet long. A bridge is required where the trail crosses Cedar Creek. This structure will have a main span length over the creek of 40 feet, a deck width of 12 feet, and will also include short-span bridges/boardwalks on either side of the main span. This memorandum is being sent in advance of our 30% design package as a means to facilitate the selection of a bridge type for the main span.

Both timber and steel prefabricated structure types are being considered, as described below. For the purposes of this memo, cost estimates provided are for the main span only. Foundation costs and approach bridge/boardwalk costs will be addressed in the 30% submittal.

## Prefabricated timber structures

A timber bridge is a relatively lightweight option that may be constructed with small equipment, which is important considering the topography immediately adjacent to the bridge site. Multiple structure cross-sections are available, and a number of pedestrian handrails could be provided. The two most appropriate structure types are a conventional section with the girders beneath the deck (referred to as a girder bridge), and a section with the girders partially above and partially below the deck (referred to as a side girder bridge). A girder bridge would require the greatest structure depth and a side girder bridge would require less depth.

As noted above, the bridge will be approached from each end by short-span bridge/boardwalk structures, which are anticipated to be timber. It is worth noting that the aesthetics of a timber main span would complement the visual appearance of the approach bridge/boardwalk structures rather well.

Representative sample images of both main span bridge types are shown below. (Photos were provided by Western Wood Structures).



*Prefabricated girder bridge*



*Side girder bridge*

## Prefabricated steel structures

A number of prefabricated steel structures are available, but the most economical type for this site is likely a half-through pony truss. This structure would consist of a pair of longitudinal trusses, with the tops of the trusses (or extensions thereof) serving as the pedestrian handrail. Floor beams are “hung” from the trusses beneath the deck/walking surface. A sample image is shown below.



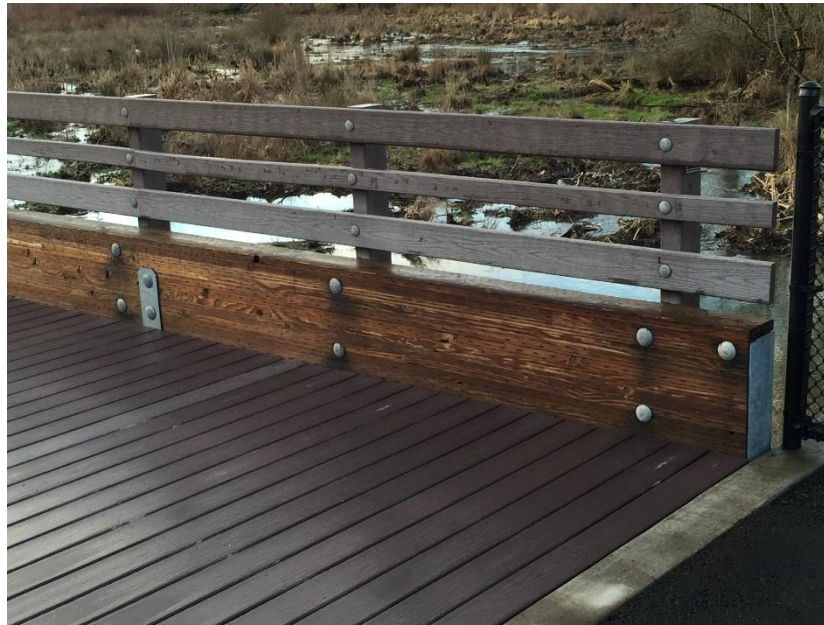
*Pony truss bridge (Source: Contech)*

A weathering steel would be the most economical of the steel structure types. This type of steel naturally takes on a protective rust-colored finish over time, thereby protecting itself against corrosion without paint. Alternatives are painted or galvanized steel structures, which would come with increased initial and long-term maintenance costs. Repainting would be required as frequently as every 2-10 years.

## Deck/walkway materials

Rough-sawn, pressure-treated decking has typically been provided with pedestrian bridges for skid resistance. Precast concrete planks could be provided to offer more skid resistance, but this option is only practical with steel structures, would come with a cost increase over the standard timber decking, and could increase foundation costs, as well.

Engineered composite decking is seeing increased use on pedestrian bridges in this area, as is composite pedestrian railing. The Tualatin Hills Parks and Recreation Department has recently incorporated composites into a number of their pedestrian structures. A sample photo is shown below.



*Composite decking and railing*

## Maintenance requirements

Proprietary suppliers of steel and timber pedestrian bridges each recommend that routine visual inspections be performed annually, and each claim that their structures will last 75 years or more. However, it is reasonable to expect some level of decay, particularly in timber decks and railings. It is advisable to keep decking (whether timber or composite is chosen) washed and clean of algae, moss, etc. Penetrating sealers could be added to timber decking intermittently, as well. It is estimated that this could be performed by two maintenance workers in a day or less. A timber bridge supplier recommends that all nuts and bolts on their products be checked and tightened after the first year of service. As noted above, a painted steel structure would require repainting at regular intervals. The use of weathering steel would eliminate this cost.

Regardless of the structure, deck, and rail type chosen, maintenance procedures should conform to all manufacturers' requirements to avoid invalidating product warranties.

## Structure cost estimates

The approximate costs below include structure design, fabrication, assembly, and delivery to the site. Timber bridges allow the general contractor the flexibility of choosing to assemble the bridge onsite, if necessary.

- Timber bridge: \$33,000 - \$45,000
- Steel bridge: \$40,000 - \$60,000

Please note that the cost estimates above do not include crane rental and labor costs necessary for placing the bridge in its final location, nor do they include the general contractor's overhead costs. Those approximate costs are shown below.

- Crane, labor, overhead: \$20,000 - \$25,000

As noted above, these cost estimates do not include foundations, nor the approach bridge/boardwalk costs. Those estimates will be provided in later submittal packages.

## Recommendation

Considering both initial and long-term costs, constructability, and aesthetic compatibility with the approach bridges/boardwalk, we recommend a timber girder bridge type for this project. To keep initial costs minimized, a conventional girder bridge (girder beneath the deck) is recommended, with the side girder type as a more expensive second option. We understand that there are ongoing discussions with others concerning long-term maintenance and performance of deck types. This information may be incorporated into the design specifications at a later time.